

## From a tick in external auditory canal to pediatric Lyme disease

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### Keypoints

This article describes a case of Lyme disease caused by a tick in external auditory canal in a 4-year-old child who presented to our clinic with cutaneous maculopapular rash of the lower and upper limbs. Symptoms regression was achieved with tick removal under general anesthesia and subsequent intravenous antibiotic therapy.

### Abstract

Lyme disease is an infectious disease caused by *Borrelia burgdorferi* infection. It is a zoonosis transmitted by ticks and is common in Europe. Its clinical presentation includes an early manifestation, which can cause local and systemic symptoms, and a late form. Erythema migrans, arthritis, facial palsy, meningitis and carditis are possible complications of the disease. We report a case of a 4-year child who presented with fever and upper and lower limbs maculopapular cutaneous rash. Left otoscopy showed the presence of a black, round-shaped foreign body attached to the postero-superior aspect of the external auditory canal (EAC), which was identified as a tick. Prompt removal of the tick was proposed. Considering the age of the patient, general anesthesia was indicated. After orotracheal intubation, the lesion was completely removed under microscopic vision. Subsequently, intravenous antibiotic therapy was continued; the day after, the patient was transferred to a pediatric department where attentive monitoring and therapy were continued, with complete resolution of the symptoms.

### Keywords

Tick, Lyme disease, Pediatric infectious disease, External auditory canal tick, Anesthesia in children, Borreliosis, Pediatric Lyme disease.

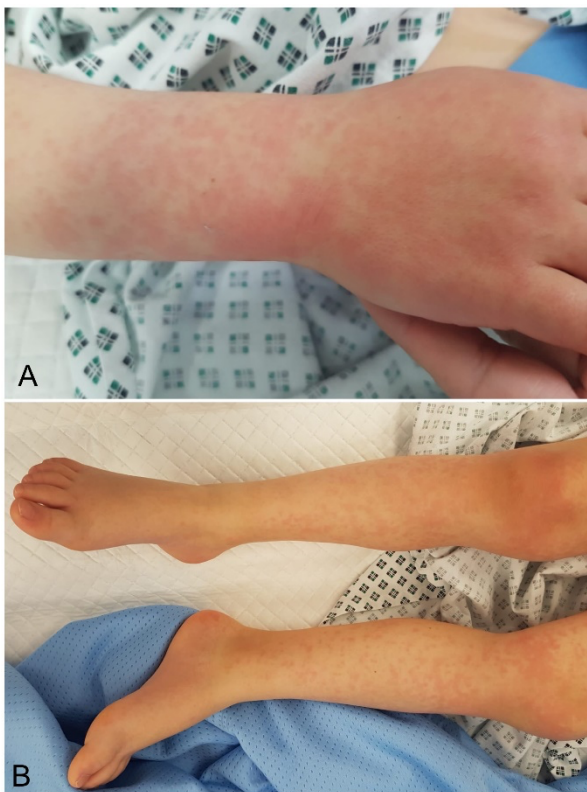
### Introduction

Ticks are known to be vectors of many systemic diseases like rickettsial diseases, Lyme disease, viral encephalitis, ehrlichiosis and babesiosis. Foreign body reactions, reactions to salivary secretions, toxins and hypersensitivity reactions may also be a consequence of tick bites. Neurological complications may as well occur after tick infestation (Patil 2012). Lyme borreliosis is caused by the transmission of *Borrelia burgdorferi*, a gram-negative spirochete. Mouse and small mammals are natural reservoirs of the bacteria. The age-specific incidence of Lyme disease is higher in children than in adults, probably because of their increased exposure to ticks. Most people become infected during spring and summer. Its clinical presentation includes an early manifestation, which can cause local and systemic symptoms, and a late form.

Erythema migrans, arthritis, facial palsy, meningitis and carditis are possible complications of the disease (Sood 2015, Gokdogan 2016). We report a case of Lyme disease in a child presenting with a suspected tick in the external auditory canal.

### Case report

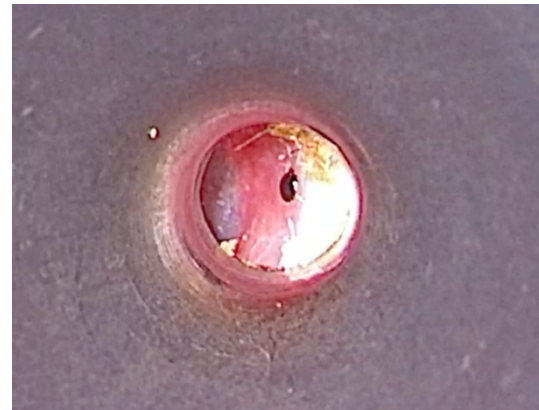
A 4-year-old child presented to our department with a history of a three days fever and presence of cutaneous maculopapular rash of the lower and upper limbs (*figure 1*).



**Figure 1.** Maculopapular cutaneous rash on the upper and lower limbs of the child. Maculopapular cutaneous rash on the upper (A) and lower (B) limbs of the child

The patient had previously received treatment with oral amoxicillin clavulanate without symptoms regression. Initial blood count showed neutrophilia and PCR and VES were found to be increased. A careful skin examination did not reveal any lesion attributable to a tick. Left otoscopy revealed a little oval-shaped black lesion attached to the postero-superior aspect of the external auditory canal (EAC, *figure 2*). Facial nerve function was

normal bilaterally. The presence of a tick in the external auditory canal and consequent Lyme disease was suspected. Prompt removal of the lesion from the left EAC was proposed.



**Figure 2.** Left otoscopy showed a round-shaped, black lesion on the posterior wall of the external auditory canal. Tympanic membrane was intact.

Considering the patient's age, general anesthesia was the preferred choice, in order to avoid any patient's movement during surgery, damages to the tympanic membrane and to grant a stable and safe airway. Anesthesiology management started with the collection of an accurate familiar, physiological, pharmacological, remote and recent pathological anamnesis, which showed anything relevant; detailed objective examination was also performed: particular attention was given to factors predictive of difficulty in airway management (the Colorado Pediatric Airway Score was used for a global assessment with a score of 6, which is predictive of a non-difficult intubation).

After monitoring vital parameters (ECG, SpO<sub>2</sub>, NIBP, temperature, Bispectral Index with pediatric sensor, neuromuscular monitoring with TOF) and after an adequate preoxygenation, general anaesthesia was inducted with administration of Fentanyl, Propofol and Rocuronium. Orotracheal intubation was performed using videolaryngoscopy, routine practice in our operating block since November 2021, which showed a full glottic view according to the Fremantle classification; a size 5 tracheal tube was used. Intubation was performed at first attempt,

with no need for additional devices. Maintenance of general anaesthesia was achieved using Sevoflurane; Dexamethasone (0.1 mg/kg ev) was administered for the prevention of Postoperative Nausea and Vomiting (PONV) and of pharyngeal edema. Under microscopic control, the black and round-shaped lesion was gently removed. Extubation at the end of anesthesia was performed after Sugammadex administration with TOFr > 90%.

There were no anesthesiological complications.

### Discussion

After the intervention the patient continued intravenous antibiotic treatment. The next day he was transferred to a pediatric department for monitoring and continuation of the antibiotic therapy. During the following days, patient symptoms gradually regressed. The surgical site on the EAC healed well at the one-week follow up visit. Lyme disease is the most common zoonotic disease transmitted by ticks in Europe. Those at highest risk are people residing or working in endemic areas for Lyme disease such as forested areas, and have occupations such as forestry workers, gamekeepers, farmers, military personnel and rangers. Orienteering, hunting, picnicking and gardening also expose individuals to more ticks and therefore increase the risk of infection. The incidence of Lyme disease has been increasing across the globe, with the number of reported cases in Europe rising from the early 1990s as well as expanding in geographic distribution. These rises in Lyme disease have been linked with not only improved diagnostics and awareness, increased tick density and burden of tick disease, but the changes in climate that have allowed ticks to spread into higher latitudes and altitudes in recent decades have also been associated. There are an estimated 85 000 cases of Lyme disease in Europe each year; however, the reporting in Europe is inconsistent and as such many infections go undiagnosed (Sykes 2016).

The age-specific incidence of Lyme disease is higher in children than in adults, presumably because of their increased exposure to ticks. Children spend more time than adults in urban green areas and school grounds for Buonamico et al. *Pediatric Lyme disease*

recreational reasons. The increased incidence in this age group can be attributed to direct contact with the environmental flora. The prognosis of Lyme disease is excellent in almost all children, including for those who present with the late disseminated manifestation of Lyme arthritis. In some cases, neuroborreliosis may occur with facial nerve palsy, meningitis, carditis, arthritis, and borreliolymphocytoma. (Sood 2015).

In humans, tick bites are painless as an anesthetic and blood thinners are introduced. Ticks are often seen or felt by the patient (Patil 2012). The tick can be found in the ear or evidenced by the presence of tick feces in the ear canal. Additionally, an otomicroscopic examination may be needed to detect the lesion. Tick feces may appear as dark brown lesions on the EAC; the presence of earwax can hide their presence (Patil 2012). In our case exposure to rural environment, a favorable climatic condition, the presence of a clinical history including fever, intermittent skin rash despite amoxicillin therapy and the finding of a lesion of the EAC attributable to a tick led to the suspicion of a Lyme disease.

Several cases of intra-aural ticks are reported in the literature, some of them presenting with facial palsy. Main complications of intra-aural foreign bodies are canal abrasion, laceration or bleeding, otitis externa, tympanic membrane perforation or rupture and suppurative otitis media (Gokdogan 2016). Gokdogan et al. reported 31 patients presenting with a tick in the external auditory canal, most of them living in rural areas. Adolescent and adult patients with a tick bite in the external auditory canal may present with symptoms of aural fullness, pruritus, crackling sensation, tinnitus, and otalgia but in infants, who are unable to express or convey these sensations, ticks are sometimes discovered only by chance, like in the present case. (Sung 2017).

### Conclusion

In this article, we report a case of Lyme borreliosis in a child caused by a tick in the external auditory canal. Even though the diagnosis was delayed due to the location of the tick bite, prompt tick removal under general

anesthesia and subsequent antibiotic treatment were effective, with complete resolution of the symptoms. In the presence of cutaneous manifestations and fever, the clinical history is important to make the diagnostic suspicion. Otoscopy as well as a careful general clinical evaluation of the patient is important to highlight the presence of a tick or a lesion attributable to the tick.

### **Disclosures**

#### **Ethical Committee approval**

The approval of the regional ethical committee is not requested for case reports.

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#### **Conflict of interest**

The authors declare no conflict of interest.

### **References**

1. Patil MM, Walikar BN, Kalyanshetkar SS, Patil SV (2012). Tick induced facial palsy. *Indian pediatrics*, 49(1), 57-67.
2. Sood SK (2015). Lyme disease in children. *Infectious Disease Clinics*, 29(2), 281-294.
3. Gökdogan O, Çakabay T, Baran H, Karabulut B, Tasdemir C, Vatansever Z (2016) Otoacariasis: demographic and clinical outcomes of patients with ticks in the ear canal. *Brazilian Journal of Otorhinolaryngology*, 82, 416-421.
4. Sykes RA, Makiello P (2017) An estimate of Lyme borreliosis incidence in Western Europe. *Journal of public health*, 39(1), 74-81.
5. Sung WJ, Kim YH. A Case of Engorged Female Hard Tick in the External Auditory Canal of an Infant. *Korean J Parasitol*. 2017 Oct;55(5):565-568.